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SEQUENCE LISTING

(1) GENERAL INFORMATION:

- (i) APPLICANT: Deboer, Herman A.
Strijker, Rein
Heyneker, Herbert L.
Platenburg, Gerald
Lee, Sang He
Pieper, Frank
Krimpenfort, Paul J.A.
- (ii) TITLE OF INVENTION: Production of Recombinant Polypeptides by Bovine Species and Transgenic Methods
- (iii) NUMBER OF SEQUENCES: 38
- (iv) CORRESPONDENCE ADDRESS:
(A) ADDRESSEE: Townsend and Townsend and Crew
(B) STREET: One Market Plaza, Steuart Tower, Suite 2000
(C) CITY: San Francisco
(D) STATE: California
(E) COUNTRY: USA
(F) ZIP: 94105
- (v) COMPUTER READABLE FORM:
(A) MEDIUM TYPE: Floppy disk
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: PatentIn Release #1.0, Version #1.25
- (vi) CURRENT APPLICATION DATA:
(A) APPLICATION NUMBER: US 08/476,798
(B) FILING DATE: 07-JUN-1995
(C) CLASSIFICATION:
- (vii) PRIOR APPLICATION DATA:
(A) APPLICATION NUMBER: US 08/077,788
(B) FILING DATE: 15-JUN-1993
- (vii) PRIOR APPLICATION DATA:
(A) APPLICATION NUMBER: US 07/895,956
(B) FILING DATE: 15-JUN-1992
- (vii) PRIOR APPLICATION DATA:
(A) APPLICATION NUMBER: US 07/619,131
(B) FILING DATE: 27-NOV-1990
- (vii) PRIOR APPLICATION DATA:
(A) APPLICATION NUMBER: US 07/444,745
(B) FILING DATE: 01-DEC-1989

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(viii) ATTORNEY/AGENT INFORMATION:

- (A) NAME: Liebescheutz, Joe O.
- (B) REGISTRATION NUMBER: 37,505
- (C) REFERENCE/DOCKET NUMBER: 16994-003125

(ix) TELECOMMUNICATION INFORMATION:

- (A) TELEPHONE: 415-543-9600
- (B) TELEFAX: 415-543-5043

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 2319 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(ix) FEATURE:

- (A) NAME/KEY: sig_peptide
- (B) LOCATION: 1..54

(ix) FEATURE:

- (A) NAME/KEY: mat_peptide
- (B) LOCATION: 55..2130

(ix) FEATURE:

- (A) NAME/KEY: CDS
- (B) LOCATION: 1..2130

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

GGA CTT GTC TTC CTC GTC CTG CTG TTC CTC GGG GCC CTC GGA CTG TGT Gly Leu Val Phe Leu Val Leu Leu Phe Leu Gly Ala Leu Gly Leu Cys -18 -15 -10 -5	48
CTG GCT GGC CGT AGG AGA AGG AGT GTT CAG TGG TGC GCC GTA TCC CAA Leu Ala Gly Arg Arg Arg Arg Ser Val Gln Trp Cys Ala Val Ser Gln 1 5 10	96
CCC GAG GCC ACA AAA TGC TTC CAA TGG CAA AGG AAT ATG AGA AAA GTG Pro Glu Ala Thr Lys Cys Phe Gln Trp Gln Arg Asn Met Arg Lys Val 15 20 25 30	144
CTG GGC CCT GTC AGC TGC ATA AAG AGA GAC TCC CCC ATC CAG TGT Leu Gly Pro Pro Val Ser Cys Ile Lys Arg Asp Ser Pro Ile Gln Cys 35 40 45	192
ATC CAG GCC ATT GCG GAA AAC AGG GCC GAT GCT GTG ACC CTT GAT GGT Ile Gln Ala Ile Ala Glu Asn Arg Ala Asp Ala Val Thr Leu Asp Gly 50 55 60	240
GGT TTC ATA TAC GAG GCA GGC CTG GCC CCC TAC AAA CTG CGA CCT GTA Gly Phe Ile Tyr Glu Ala Gly Leu Ala Pro Tyr Lys Leu Arg Pro Val 65 70 75	288
GCG GCG GAA GTC TAC GGG ACC GAA AGA CAG CCA CGA ACT CAC TAT TAT Ala Ala Glu Val Tyr Gly Thr Glu Arg Gln Pro Arg Thr His Tyr Tyr 80 85 90	336

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CGG GTG GCT GTG GTG AAG AAG GGC GGC AGC TTT CAG CTG AAC GAA CTG Arg Val Ala Val Val Lys Lys Gly Gly Ser Phe Gln Leu Asn Glu Leu 95 100 105 110	384
CAA GGT CTG AAG TCC TGC CAC ACA GGC CTT CGC AGG ACC GCT GGA TGG Gln Gly Leu Lys Ser Cys His Thr Gly Leu Arg Arg Thr Ala Gly Trp 115 120 125	432
AAT GTC CCT ACA GGG ACA CTT CGT CCA TTC TTG AAT TGG ACG GGT CCA Asn Val Pro Thr Gly Thr Leu Arg Pro Phe Leu Asn Trp Thr Gly Pro 130 135 140	480
CCT GAG CCC ATT GAG GCA GCT GTG CAG TTC TTC TCA GCC AGC TGT GTT Pro Glu Pro Ile Glu Ala Ala Val Gln Phe Phe Ser Ala Ser Cys Val 145 150 155	528
CCC GGT GCA GAT AAA GGA CAG TTC CCC AAC CTG TGT CGC CTG TGT GCG Pro Gly Ala Asp Lys Gly Gln Phe Pro Asn Leu Cys Arg Leu Cys Ala 160 165 170	576
GGG ACA GGG GAA AAC AAA TGT GCC TTC TCC TCC CAG GAA CCG TAC TTC Gly Thr Gly Glu Asn Lys Cys Ala Phe Ser Ser Gln Glu Pro Tyr Phe 175 180 185 190	624
AGC TAC TCT GGT GCC TTC AAG TGT CTG AGA GAC GGG GCT GGA GAC GTG Ser Tyr Ser Gly Ala Phe Lys Cys Leu Arg Asp Gly Ala Gly Asp Val 195 200 205	672
GCT TTT ATC AGA GAG AGC ACA GTG TTT GAG GAC CTG TCA GAC GAG GCT Ala Phe Ile Arg Glu Ser Thr Val Phe Glu Asp Leu Ser Asp Glu Ala 210 215 220	720
GAA AGG GAC GAG TAT GAG TTA CTC TGC CCA GAC AAC ACT CGG AAG CCA Glu Arg Asp Glu Tyr Glu Leu Leu Cys Pro Asp Asn Thr Arg Lys Pro 225 230 235	768
GTG GAC AAG TTC AAA GAC TGC CAT CTG GCC CGG GTC CCT TCT CAT GCC Val Asp Lys Phe Lys Asp Cys His Leu Ala Arg Val Pro Ser His Ala 240 245 250	816
GTT GTG GCA CGA AGT GTG AAT GGC AAG GAG GAT GCC ATC TGG AAT CTT Val Val Ala Arg Ser Val Asn Gly Lys Glu Asp Ala Ile Trp Asn Leu 255 260 265 270	864
CTC CGC CAG GCA CAG GAA AAG TTT GGA AAG GAC AAG TCA CCG AAA TTC Leu Arg Gln Ala Gln Glu Lys Phe Gly Lys Asp Lys Ser Pro Lys Phe 275 280 285	912
CAG CTC TTT GGC TCC CCT AGT GGG CAG AAA GAT CTG CTG TTC AAG GAC Gln Leu Phe Gly Ser Pro Ser Gly Gln Lys Asp Leu Leu Phe Lys Asp 290 295 300	960

TCT	GCC	ATT	GGG	TTT	TCG	AGG	GTG	CCC	CCG	AGG	ATA	GAT	TCT	GGG	CTG	1008
Ser	Ala	Ile	Gly	Phe	Ser	Arg	Val	Pro	Pro	Arg	Ile	Asp	Ser	Gly	Leu	
305				310						315						
TAC	CTT	GGC	TCC	GGC	TAC	TTC	ACT	GCC	ATC	CAG	AAC	TTG	AGG	AAA	AGT	1056
Tyr	Leu	Gly	Ser	Gly	Tyr	Phe	Thr	Ala	Ile	Gln	Asn	Leu	Arg	Lys	Ser	
320			325							330						
GAG	GAG	GAA	GTG	GCT	GCC	CGG	CGT	GCG	CGG	GTC	GTG	TGG	TGT	GCG	GTG	1104
Glu	Glu	Glu	Val	Ala	Ala	Arg	Arg	Ala	Arg	Val	Val	Trp	Cys	Ala	Val	
335				340				345						350		
GGC	GAG	CAG	GAG	CTG	CGC	AAG	TGT	AAC	CAG	TGG	AGT	GGC	TTG	AGC	GAA	1152
Gly	Glu	Gln	Glu	Leu	Arg	Lys	Cys	Asn	Gln	Trp	Ser	Gly	Leu	Ser	Glu	
				355				360						365		
GGC	AGC	GTG	ACC	TGC	TCC	TCG	GCC	TCC	ACC	ACA	GAG	GAC	TGC	ATC	GCC	1200
Gly	Ser	Val	Thr	Cys	Ser	Ser	Ala	Ser	Thr	Thr	Glu	Asp	Cys	Ile	Ala	
				370				375					380			
CTG	GTG	CTG	AAA	GGA	GAA	GCT	GAT	GCC	ATG	AGT	TTG	GAT	GGA	GGA	TAT	1248
Leu	Val	Leu	Lys	Gly	Glu	Ala	Asp	Ala	Met	Ser	Leu	Asp	Gly	Gly	Tyr	
				385				390				395				
GTG	TAC	ACT	GCA	TGC	AAA	TGT	GGT	TTG	GTG	CCT	GTC	CTG	GCA	GAG	AAC	1296
Val	Tyr	Thr	Ala	Cys	Lys	Cys	Gly	Leu	Val	Pro	Val	Leu	Ala	Glu	Asn	
				400				405				410				
TAC	AAA	TCC	CAA	CAA	AGC	AGT	GAC	CCT	GAT	CCT	AAC	TGT	GTG	GAT	AGA	1344
Tyr	Lys	Ser	Gln	Gln	Ser	Ser	Asp	Pro	Asp	Pro	Asn	Cys	Val	Asp	Arg	
				415				420			425			430		
CCT	GTG	GAA	GGA	TAT	CTT	GCT	GTG	GCG	GTG	GTT	AGG	AGA	TCA	GAC	ACT	1392
Pro	Val	Glu	Gly	Tyr	Leu	Ala	Val	Ala	Val	Val	Arg	Arg	Ser	Asp	Thr	
				435				440			445					
AGC	CTT	ACC	TGG	AAC	TCT	GTG	AAA	GGC	AAG	AAG	TCC	TGC	CAC	ACC	GCC	1440
Ser	Leu	Thr	Trp	Asn	Ser	Val	Lys	Gly	Lys	Lys	Ser	Cys	His	Thr	Ala	
				450				455			460					
GTG	GAC	AGG	ACT	GCA	GGC	TGG	AAT	ATC	CCC	ATG	GGC	CTG	CTC	TTC	AAC	1488
Val	Asp	Arg	Thr	Ala	Gly	Trp	Asn	Ile	Pro	Met	Gly	Leu	Leu	Phe	Asn	
				465				470			475					
CAG	ACG	GGC	TCC	TGC	AAA	TTT	GAT	GAA	TAT	TTC	AGT	CAA	AGC	TGT	GCC	1536
Gln	Thr	Gly	Ser	Cys	Lys	Phe	Asp	Glu	Tyr	Phe	Ser	Gln	Ser	Cys	Ala	
				480				485			490					
CCT	GGG	TCT	GAC	CCG	AGA	TCT	AAT	CTC	TGT	GCT	CTG	TGT	ATT	GGC	GAC	1584
Pro	Gly	Ser	Asp	Pro	Arg	Ser	Asn	Leu	Cys	Ala	Leu	Cys	Ile	Gly	Asp	
				495				500			505			510		

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GAG CAG GGT GAG AAT AAG TGC GTG CCC AAC AGC AAT GAG AGA TAC TAC Glu Gln Gly Glu Asn Lys Cys Val Pro Asn Ser Asn Glu Arg Tyr Tyr 515 520 525	1632
GGC TAC ACT GGG GCT TTC CGG TGC CTG GCT GAG AAT GCT GGA GAC GTT Gly Tyr Thr Gly Ala Phe Arg Cys Leu Ala Glu Asn Ala Gly Asp Val 530 535 540	1680
GCA TTT GTG AAA GAT GTC ACT GTC TTG CAG AAC ACT GAT GGA AAT AAC Ala Phe Val Lys Asp Val Thr Val Leu Gln Asn Thr Asp Gly Asn Asn 545 550 555	1728
AAT GAG GCA TGG GCT AAG GAT TTG AAG CTG GCA GAC TTT GCG CTG CTG Asn Glu Ala Trp Ala Lys Asp Leu Lys Leu Ala Asp Phe Ala Leu Leu 560 565 570	1776
TGC CTC GAT GGC AAA CGG AAG CCT GTG ACT GAG GCT AGA AGC TGC CAT Cys Leu Asp Gly Lys Arg Lys Pro Val Thr Glu Ala Arg Ser Cys His 575 580 585 590	1824
CTT GCC ATG GCC CCG AAT CAT GCC GTG GTG TCT CGG ATG GAT AAG GTG Leu Ala Met Ala Pro Asn His Ala Val Val Ser Arg Met Asp Lys Val 595 600 605	1872
GAA CGC CTG AAA CAG GTG CTG CTC CAC CAA CAG GCT AAA TTT GGG AGA Glu Arg Leu Lys Gln Val Leu Leu His Gln Gln Ala Lys Phe Gly Arg 610 615 620	1920
AAT GGA TCT GAC TGC CCG GAC AAG TTT TGC TTA TTC CAG TCT GAA ACC Asn Gly Ser Asp Cys Pro Asp Lys Phe Cys Leu Phe Gln Ser Glu Thr 625 630 635	1968
AAA AAC CTT CTG TTC AAT GAC AAC ACT GAG TGT CTG GCC AGA CTC CAT Lys Asn Leu Leu Phe Asn Asp Asn Thr Glu Cys Leu Ala Arg Leu His 640 645 650	2016
GGC AAA ACA ACA TAT GAA AAA TAT TTG GGA CCA CAG TAT GTC GCA GGC Gly Lys Thr Thr Tyr Glu Lys Tyr Leu Gly Pro Gln Tyr Val Ala Gly 655 660 665 670	2064
ATT ACT AAT CGT AAA AAG TGC TCA ACC TCC CCC CTC CTG GAA GCC TGT Ile Thr Asn Arg Lys Lys Cys Ser Thr Ser Pro Leu Leu Glu Ala Cys 675 680 685	2112
GAA TTC CTC AGG AAG TAAAACCGAA GAAGATGGCC CAGCTCCCCA AGAAAGCCTC Glu Phe Leu Arg Lys 690	2167
AGCCATTACAC TGCCCCCAGC TCTTCTCCCC AGGTGTGTTG GGGCCTGGC TCCCCTGCTG AAGGTGGGGA TTGCCCATCC ATCTGCTTAC AATTCCCTGC TGTCGTCTTA GCAAGAAGTA	2227
AAATGAGAAA TTTTGTGAT ATTAAAAAA AA	2287
	2319

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 709 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Gly Leu Val Phe Leu Val Leu Leu Phe Leu Gly Ala Leu Gly Leu Cys
-18 -15 -10 -5

Leu Ala Gly Arg Arg Arg Ser Val Gln Trp Cys Ala Val Ser Gln
1 5 10

Pro Glu Ala Thr Lys Cys Phe Gln Trp Gln Arg Asn Met Arg Lys Val
15 20 25 30

Leu Gly Pro Pro Val Ser Cys Ile Lys Arg Asp Ser Pro Ile Gln Cys
35 40 45

Ile Gln Ala Ile Ala Glu Asn Arg Ala Asp Ala Val Thr Leu Asp Gly
50 55 60

Gly Phe Ile Tyr Glu Ala Gly Leu Ala Pro Tyr Lys Leu Arg Pro Val
65 70 75

Ala Ala Glu Val Tyr Gly Thr Glu Arg Gln Pro Arg Thr His Tyr Tyr
80 85 90

Arg Val Ala Val Val Lys Lys Gly Gly Ser Phe Gln Leu Asn Glu Leu
95 100 105 110

Gln Gly Leu Lys Ser Cys His Thr Gly Leu Arg Arg Thr Ala Gly Trp
115 120 125

Asn Val Pro Thr Gly Thr Leu Arg Pro Phe Leu Asn Trp Thr Gly Pro
130 135 140

Pro Glu Pro Ile Glu Ala Ala Val Gln Phe Phe Ser Ala Ser Cys Val
145 150 155

Pro Gly Ala Asp Lys Gly Gln Phe Pro Asn Leu Cys Arg Leu Cys Ala
160 165 170

Gly Thr Gly Glu Asn Lys Cys Ala Phe Ser Ser Gln Glu Pro Tyr Phe
175 180 185 190

Ser Tyr Ser Gly Ala Phe Lys Cys Leu Arg Asp Gly Ala Gly Asp Val
195 200 205

Ala Phe Ile Arg Glu Ser Thr Val Phe Glu Asp Leu Ser Asp Glu Ala
210 215 220

Glu Arg Asp Glu Tyr Glu Leu Leu Cys Pro Asp Asn Thr Arg Lys Pro
225 230 235

Val Asp Lys Phe Lys Asp Cys His Leu Ala Arg Val Pro Ser His Ala
240 245 250

Val Val Ala Arg Ser Val Asn Gly Lys Glu Asp Ala Ile Trp Asn Leu
255 260 265 270

Leu Arg Gln Ala Gln Glu Lys Phe Gly Lys Asp Lys Ser Pro Lys Phe
275 280 285

Gln Leu Phe Gly Ser Pro Ser Gly Gln Lys Asp Leu Leu Phe Lys Asp
290 295 300

Ser Ala Ile Gly Phe Ser Arg Val Pro Pro Arg Ile Asp Ser Gly Leu
305 310 315

Tyr Leu Gly Ser Gly Tyr Phe Thr Ala Ile Gln Asn Leu Arg Lys Ser
320 325 330

Glu Glu Glu Val Ala Ala Arg Arg Ala Arg Val Val Trp Cys Ala Val
335 340 345 350

Gly Glu Gln Glu Leu Arg Lys Cys Asn Gln Trp Ser Gly Leu Ser Glu
355 360 365

Gly Ser Val Thr Cys Ser Ser Ala Ser Thr Thr Glu Asp Cys Ile Ala
370 375 380

Leu Val Leu Lys Gly Glu Ala Asp Ala Met Ser Leu Asp Gly Gly Tyr
385 390 395

Val Tyr Thr Ala Cys Lys Cys Gly Leu Val Pro Val Leu Ala Glu Asn
400 405 410

Tyr Lys Ser Gln Gln Ser Ser Asp Pro Asp Pro Asn Cys Val Asp Arg
415 420 425 430

Pro Val Glu Gly Tyr Leu Ala Val Ala Val Val Arg Arg Ser Asp Thr
435 440 445

Ser Leu Thr Trp Asn Ser Val Lys Gly Lys Lys Ser Cys His Thr Ala
450 455 460

Val Asp Arg Thr Ala Gly Trp Asn Ile Pro Met Gly Leu Leu Phe Asn
465 470 475

Gln Thr Gly Ser Cys Lys Phe Asp Glu Tyr Phe Ser Gln Ser Cys Ala
480 485 490

Pro Gly Ser Asp Pro Arg Ser Asn Leu Cys Ala Leu Cys Ile Gly Asp
495 500 505 510

Glu Gln Gly Glu Asn Lys Cys Val Pro Asn Ser Asn Glu Arg Tyr Tyr
515 520 525

Gly Tyr Thr Gly Ala Phe Arg Cys Leu Ala Glu Asn Ala Gly Asp Val
530 535 540

Ala Phe Val Lys Asp Val Thr Val Leu Gln Asn Thr Asp Gly Asn Asn
545 550 555

Asn Glu Ala Trp Ala Lys Asp Leu Lys Leu Ala Asp Phe Ala Leu Leu
560 565 570

Cys Leu Asp Gly Lys Arg Lys Pro Val Thr Glu Ala Arg Ser Cys His
575 580 585 590

Leu Ala Met Ala Pro Asn His Ala Val Val Ser Arg Met Asp Lys Val
595 600 605

Glu Arg Leu Lys Gln Val Leu Leu His Gln Gln Ala Lys Phe Gly Arg
610 615 620

Asn Gly Ser Asp Cys Pro Asp Lys Phe Cys Leu Phe Gln Ser Glu Thr
625 630 635

Lys Asn Leu Leu Phe Asn Asp Asn Thr Glu Cys Leu Ala Arg Leu His
640 645 650

Gly Lys Thr Thr Tyr Glu Lys Tyr Leu Gly Pro Gln Tyr Val Ala Gly
655 660 665 670

Ile Thr Asn Arg Lys Lys Cys Ser Thr Ser Pro Leu Leu Glu Ala Cys
675 680 685

Glu Phe Leu Arg Lys
690

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 2619 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(ix) FEATURE:
(A) NAME/KEY: sig_peptide
(B) LOCATION: 295..351

(ix) FEATURE:
(A) NAME/KEY: mat_peptide
(B) LOCATION: 352..2430

(ix) FEATURE:
(A) NAME/KEY: CDS
(B) LOCATION: 295..2430

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

GACTCCTAGG GGCTTGCAGA CCTAGTGGGA GAGAAAGAAC ATCGCAGCAG CCAGGCAGAA	60
CCAGGACAGG TGAGGTGCAG GCTGGCTTTC CTCTCGCAGC GCGGTGTGGA GTCTGTCTT	120
GCCTCAGGGC TTTTCGGAGC CTGGATCCTC AAGGAACAAG TAGACCTGGC CGCGGGGAGT	180
GGGGAGGGAA GGGGTGTCTA TTGGGCAACA GGGCGGCAAA GCCCTGAATA AAGGGGCGCA	240
GGGCAGGCCG AAGTGCAGAG CCTTCGTTTG CCAAGTCGCC TCCAGACCGC AGAC ATG	297
Met	
	-19
AAA CTT GTC TTC CTC GTC CTG CTG TTC CTC GGG GCC CTC GGA CTG TGT	345
Lys Leu Val Phe Leu Val Leu Phe Leu Gly Ala Leu Gly Leu Cys	
-15	-10
	-5
CTG GCT GGC CGT AGG AGA AGG AGT GTT CAG TGG TGC GCC GTA TCC CAA	393
Leu Ala Gly Arg Arg Arg Ser Val Gln Trp Cys Ala Val Ser Gln	
1	5
	10
CCC GAG GCC ACA AAA TGC TTC CAA TGG CAA AGG AAT ATG AGA AAA GTG	441
Pro Glu Ala Thr Lys Cys Phe Gln Trp Gln Arg Asn Met Arg Lys Val	
15	20
	25
	30
CGT GGC CCT GTC AGC TGC ATA AAG AGA GAC TCC CCC ATC CAG TGT	489
Arg Gly Pro Pro Val Ser Cys Ile Lys Arg Asp Ser Pro Ile Gln Cys	
35	40
	45

ATC CAG GCC ATT GCG GAA AAC AGG GCC GAT GCT GTG ACC CTT GAT GGT Ile Gln Ala Ile Ala Glu Asn Arg Ala Asp Ala Val Thr Leu Asp Gly 50 55 60	537
GGT TTC ATA TAC GAG GCA GGC CTG GCC CCC TAC AAA CTG CGA CCT GTA Gly Phe Ile Tyr Glu Ala Gly Leu Ala Pro Tyr Lys Leu Arg Pro Val 65 70 75	585
GCG GCG GAA GTC TAC GGG ACC GAA AGA CAG CCA CGA ACT CAC TAT TAT Ala Ala Glu Val Tyr Gly Thr Glu Arg Gln Pro Arg Thr His Tyr Tyr 80 85 90	633
GCC GTG GCT GTG GTG AAG AAG GGC GGC AGC TTT CAG CTG AAC GAA CTG Ala Val Ala Val Val Lys Lys Gly Gly Ser Phe Gln Leu Asn Glu Leu 95 100 105 110	681
CAA GGT CTG AAG TCC TGC CAC ACA GGC CTT CGC AGG ACC GCT GGA TGG Gln Gly Leu Lys Ser Cys His Thr Gly Leu Arg Arg Thr Ala Gly Trp 115 120 125	729
AAT GTC CCT ACA GGG ACA CTT CGT CCA TTC TTG AAT TGG ACG GGT CCA Asn Val Pro Thr Gly Thr Leu Arg Pro Phe Leu Asn Trp Thr Gly Pro 130 135 140	777
CCT GAG CCC ATT GAG GCA GCT GTG GCC AGG TTC TTC TCA GCC AGC TGT Pro Glu Pro Ile Glu Ala Ala Val Ala Arg Phe Phe Ser Ala Ser Cys 145 150 155	825
GTT CCC GGT GCA GAT AAA GGA CAG TTC CCC AAC CTG TGT CGC CTG TGT Val Pro Gly Ala Asp Lys Gly Gln Phe Pro Asn Leu Cys Arg Leu Cys 160 165 170	873
GCG GGG ACA GGG GAA AAC AAA TGT GCC TTC TCC TCC CAG GAA CCG TAC Ala Gly Thr Gly Glu Asn Lys Cys Ala Phe Ser Ser Gln Glu Pro Tyr 175 180 185 190	921
TTC AGC TAC TCT GGT GCC TTC AAG TGT CTG AGA GAC GGG GCT GGA GAC Phe Ser Tyr Ser Gly Ala Phe Lys Cys Leu Arg Asp Gly Ala Gly Asp 195 200 205	969
GTG GCT TTT ATC AGA GAG AGC ACA GTG TTT GAG GAC CTG TCA GAC GAG Val Ala Phe Ile Arg Glu Ser Thr Val Phe Glu Asp Leu Ser Asp Glu 210 215 220	1017
GCT GAA AGG GAC GAG TAT GAG TTA CTC TGC CCA GAC AAC ACT CGG AAG Ala Glu Arg Asp Glu Tyr Glu Leu Leu Cys Pro Asp Asn Thr Arg Lys 225 230 235	1065
CCA GTG GAC AAG TTC AAA GAC TGC CAT CTG GCC CGG GTC CCT TCT CAT Pro Val Asp Lys Phe Lys Asp Cys His Leu Ala Arg Val Pro Ser His 240 245 250	1113

GCC GTT GTG GCA CGA AGT GTG AAT GGC AAG GAG GAT GCC ATC TGG AAT Ala Val Val Ala Arg Ser Val Asn Gly Lys Glu Asp Ala Ile Trp Asn 255 260 265 270	1161
CTT CTC CGC CAG GCA CAG GAA AAG TTT GGA AAG GAC AAG TCA CCG AAA Leu Leu Arg Gln Ala Gln Glu Lys Phe Gly Lys Asp Lys Ser Pro Lys 275 280 285	1209
TTC CAG CTC TTT GGC TCC CCT AGT GGG CAG AAA GAT CTG CTG TTC AAG Phe Gln Leu Phe Gly Ser Pro Ser Gly Gln Lys Asp Leu Leu Phe Lys 290 295 300	1257
GAC TCT GCC ATT GGG TTT TCG AGG GTG CCC CCG AGG ATA GAT TCT GGG Asp Ser Ala Ile Gly Phe Ser Arg Val Pro Pro Arg Ile Asp Ser Gly 305 310 315	1305
CTG TAC CTT GGC TCC GGC TAC TTC ACT GCC ATC CAG AAC TTG AGG AAA Leu Tyr Leu Gly Ser Gly Tyr Phe Thr Ala Ile Gln Asn Leu Arg Lys 320 325 330	1353
AGT GAG GAG GAA GTG GCT GCC CGG CGT GCG CGG GTC GTG TGG TGT GCG Ser Glu Glu Glu Val Ala Ala Arg Arg Ala Arg Val Val Trp Cys Ala 335 340 345 350	1401
GTG GGC GAG CAG GAG CTG CGC AAG TGT AAC CAG TGG AGT GGC TTG AGC Val Gly Glu Gln Glu Leu Arg Lys Cys Asn Gln Trp Ser Gly Leu Ser 355 360 365	1449
GAA GGC AGC GTG ACC TGC TCC TCG GCC TCC ACC ACA GAG GAC TGC ATC Glu Gly Ser Val Thr Cys Ser Ser Ala Ser Thr Thr Glu Asp Cys Ile 370 375 380	1497
GCC CTG GTG CTG AAA GGA GAA GCT GAT GCC ATG AGT TTG GAT GGA GGA Ala Leu Val Leu Lys Gly Glu Ala Asp Ala Met Ser Leu Asp Gly Gly 385 390 395	1545
TAT GTG TAC ACT GCA TGC AAA TGT GGT TTG GTG CCT GTC CTG GCA GAG Tyr Val Tyr Thr Ala Cys Lys Cys Gly Leu Val Pro Val Leu Ala Glu 400 405 410	1593
AAC TAC AAA TCC CAA CAA AGC AGT GAC CCT GAT CCT AAC TGT GTG GAT Asn Tyr Lys Ser Gln Gln Ser Ser Asp Pro Asp Pro Asn Cys Val Asp 415 420 425 430	1641
AGA CCT GTG GAA GGA TAT CTT GCT GTG GCG GTG GTT AGG AGA TCA GAC Arg Pro Val Glu Gly Tyr Leu Ala Val Ala Val Val Arg Arg Ser Asp 435 440 445	1689
ACT AGC CTT ACC TGG AAC TCT GTG AAA GGC AAG AAG TCC TGC CAC ACC Thr Ser Leu Thr Trp Asn Ser Val Lys Gly Lys Lys Ser Cys His Thr 450 455 460	1737

GCC GTG GAC AGG ACT GCA GGC TGG AAT ATC CCC ATG GGC CTG CTC TCC Ala Val Asp Arg Thr Ala Gly Trp Asn Ile Pro Met Gly Leu Leu Ser	1785
465 470 475	
AAC CAG ACG GGC TCC TGC AAA TTT GAT GAA TAT TTC AGT CAA AGC TGT Asn Gln Thr Gly Ser Cys Lys Phe Asp Glu Tyr Phe Ser Gln Ser Cys	1833
480 485 490	
GCC CCT GGG TCT GAC CCG AGA TCT AAT CTC TGT GCT CTG TGT ATT GGC Ala Pro Gly Ser Asp Pro Arg Ser Asn Leu Cys Ala Leu Cys Ile Gly	1881
495 500 505 510	
GAC GAG CAG GGT GAG AAT AAG TGC GTG CCC AAC AGC AAC GAG AGA TAC Asp Glu Gln Gly Glu Asn Lys Cys Val Pro Asn Ser Asn Glu Arg Tyr	1929
515 520 525	
TAC GGC TAC ACT GGG GCT TTC CGG TGC CTG GCT GAG AAT GCT GGA GAC Tyr Gly Tyr Thr Gly Ala Phe Arg Cys Leu Ala Glu Asn Ala Gly Asp	1977
530 535 540	
GTT GCA TTT GTG AAA GAT GTC ACT GTC TTG CAG AAC ACT GAT GGA AAT Val Ala Phe Val Lys Asp Val Thr Val Leu Gln Asn Thr Asp Gly Asn	2025
545 550 555	
AAC AAT GAG GCA TGG GCT AAG GAT TTG AAC CTG GCA GAC TTT GCG CTG Asn Asn Glu Ala Trp Ala Lys Asp Leu Asn Leu Ala Asp Phe Ala Leu	2073
560 565 570	
CTG TGC CTC GAT GGC AAA CGG AAG CCT GTG ACT GAC GCT AGA AGC TGC Leu Cys Leu Asp Gly Lys Arg Lys Pro Val Thr Asp Ala Arg Ser Cys	2121
575 580 585 590	
CAT CTT GCC ATG GCC CCG AAT CAT GCC GTG GTG TCT CCG ATG GAT AAG His Leu Ala Met Ala Pro Asn His Ala Val Val Ser Arg Met Asp Lys	2169
595 600 605	
GTG GAA CGC CTG AAA CAG GTG CTG CTC CAC CAA CAG GCT AAA TTT GGG Val Glu Arg Leu Lys Gln Val Leu Leu His Gln Gln Ala Lys Phe Gly	2217
610 615 620	
AGA AAT GGA TCT GAC TGC CCG CAG AAG TTT TGC TTA TTC CAG TCT GAA Arg Asn Gly Ser Asp Cys Pro Gln Lys Phe Cys Leu Phe Gln Ser Glu	2265
625 630 635	
ACC AAA AAC CTT CTG TTC AAT GAC AAC ACT GAG TGT CTG GCC AGA CTC Thr Lys Asn Leu Leu Phe Asn Asp Asn Thr Glu Cys Leu Ala Arg Leu	2313
640 645 650	
CAT GGC AAA ACA ACA TAT GAA AAA TAT TTG GGA CCA CAG TAT GTC GCA His Gly Lys Thr Thr Tyr Glu Lys Tyr Leu Gly Pro Gln Tyr Val Ala	2361
655 660 665 670	

133

GGC ATT ACT AAT CTG AAA AAG TGC TCA ACC TCC CCC CTC CTG GAA GCC	2409
Gly Ile Thr Asn Leu Lys Lys Cys Ser Thr Ser Pro Leu Leu Glu Ala	
675 680 685	
TGT GAA TTC CTC AGG AAG TAAAACCGAA GAAGATGGCC CAGCTCCCCA	2457
Cys Glu Phe Leu Arg Lys	
690	
AGAAAGCCTC AGCCATTAC TGCCCCAGC TCTTCTCCCC AGGTGTGTTG GGGCCTTGGC	2517
TCCCCCTGCTG AAGGTGGGGA TTGCCCATCC ATCTGCTTAC AATTCCCTGC TGTCGTCTTA	2577
GCAAGAAGTA AAATGAGAAA TTTTGTGAT ATTCAAAAAA AA	2619

134

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 711 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Met Lys Leu Val Phe Leu Val Leu Phe Leu Gly Ala Leu Gly Leu
-19 -15 -10 -5

Cys Leu Ala Gly Arg Arg Arg Ser Val Gln Trp Cys Ala Val Ser
1 5 10

Gln Pro Glu Ala Thr Lys Cys Phe Gln Trp Gln Arg Asn Met Arg Lys
15 20 25

Val Arg Gly Pro Pro Val Ser Cys Ile Lys Arg Asp Ser Pro Ile Gln
30 35 40 45

Cys Ile Gln Ala Ile Ala Glu Asn Arg Ala Asp Ala Val Thr Leu Asp
50 55 60

Gly Gly Phe Ile Tyr Glu Ala Gly Leu Ala Pro Tyr Lys Leu Arg Pro
65 70 75

Val Ala Ala Glu Val Tyr Gly Thr Glu Arg Gln Pro Arg Thr His Tyr
80 85 90

Tyr Ala Val Ala Val Val Lys Lys Gly Ser Phe Gln Leu Asn Glu
95 100 105

Leu Gln Gly Leu Lys Ser Cys His Thr Gly Leu Arg Arg Thr Ala Gly
110 115 120 125

Trp Asn Val Pro Thr Gly Thr Leu Arg Pro Phe Leu Asn Trp Thr Gly
130 135 140

Pro Pro Glu Pro Ile Glu Ala Ala Val Ala Arg Phe Phe Ser Ala Ser
145 150 155

Cys Val Pro Gly Ala Asp Lys Gly Gln Phe Pro Asn Leu Cys Arg Leu
160 165 170

Cys Ala Gly Thr Gly Glu Asn Lys Cys Ala Phe Ser Ser Gln Glu Pro
175 180 185

Tyr Phe Ser Tyr Ser Gly Ala Phe Lys Cys Leu Arg Asp Gly Ala Gly
190 195 200 205

Asp Val Ala Phe Ile Arg Glu Ser Thr Val Phe Glu Asp Leu Ser Asp
210 215 220

Glu Ala Glu Arg Asp Glu Tyr Glu Leu Leu Cys Pro Asp Asn Thr Arg
225 230 235

Lys Pro Val Asp Lys Phe Lys Asp Cys His Leu Ala Arg Val Pro Ser
240 245 250

His Ala Val Val Ala Arg Ser Val Asn Gly Lys Glu Asp Ala Ile Trp
255 260 265

Asn Leu Leu Arg Gln Ala Gln Glu Lys Phe Gly Lys Asp Lys Ser Pro
270 275 280 285

Lys Phe Gln Leu Phe Gly Ser Pro Ser Gly Gln Lys Asp Leu Leu Phe
290 295 300

Lys Asp Ser Ala Ile Gly Phe Ser Arg Val Pro Pro Arg Ile Asp Ser
305 310 315

Gly Leu Tyr Leu Gly Ser Gly Tyr Phe Thr Ala Ile Gln Asn Leu Arg
320 325 330

Lys Ser Glu Glu Glu Val Ala Ala Arg Arg Ala Arg Val Val Trp Cys
335 340 345

Ala Val Gly Glu Gln Glu Leu Arg Lys Cys Asn Gln Trp Ser Gly Leu
350 355 360 365

Ser Glu Gly Ser Val Thr Cys Ser Ser Ala Ser Thr Thr Glu Asp Cys
370 375 380

Ile Ala Leu Val Leu Lys Gly Glu Ala Asp Ala Met Ser Leu Asp Gly
385 390 395

Gly Tyr Val Tyr Thr Ala Cys Lys Cys Gly Leu Val Pro Val Leu Ala
400 405 410

Glu Asn Tyr Lys Ser Gln Gln Ser Ser Asp Pro Asp Pro Asn Cys Val
415 420 425

Asp Arg Pro Val Glu Gly Tyr Leu Ala Val Ala Val Val Arg Arg Ser
430 435 440 445

Asp Thr Ser Leu Thr Trp Asn Ser Val Lys Gly Lys Lys Ser Cys His
450 455 460

Thr Ala Val Asp Arg Thr Ala Gly Trp Asn Ile Pro Met Gly Leu Leu
465 470 475

Ser Asn Gln Thr Gly Ser Cys Lys Phe Asp Glu Tyr Phe Ser Gln Ser
480 485 490

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Cys Ala Pro Gly Ser Asp Pro Arg Ser Asn Leu Cys Ala Leu Cys Ile
495 500 505

Gly Asp Glu Gln Gly Glu Asn Lys Cys Val Pro Asn Ser Asn Glu Arg
510 515 520 525

Tyr Tyr Gly Tyr Thr Gly Ala Phe Arg Cys Leu Ala Glu Asn Ala Gly
530 535 540

Asp Val Ala Phe Val Lys Asp Val Thr Val Leu Gln Asn Thr Asp Gly
545 550 555

Asn Asn Asn Glu Ala Trp Ala Lys Asp Leu Asn Leu Ala Asp Phe Ala
560 565 570

Leu Leu Cys Leu Asp Gly Lys Arg Lys Pro Val Thr Asp Ala Arg Ser
575 580 585

Cys His Leu Ala Met Ala Pro Asn His Ala Val Val Ser Arg Met Asp
590 595 600 605

Lys Val Glu Arg Leu Lys Gln Val Leu Leu His Gln Gln Ala Lys Phe
610 615 620

Gly Arg Asn Gly Ser Asp Cys Pro Gln Lys Phe Cys Leu Phe Gln Ser
625 630 635

Glu Thr Lys Asn Leu Leu Phe Asn Asp Asn Thr Glu Cys Leu Ala Arg
640 645 650

Leu His Gly Lys Thr Thr Tyr Glu Lys Tyr Leu Gly Pro Gln Tyr Val
655 660 665

Ala Gly Ile Thr Asn Leu Lys Lys Cys Ser Thr Ser Pro Leu Leu Glu
670 675 680 685

Ala Cys Glu Phe Leu Arg Lys
690

(2) INFORMATION FOR SEQ ID NO:5:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 26 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

TCCATGGGGG TCACAAAGAA CTGGAC

26

(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 27 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

TGAAGCTTGC TAACAGTATA TCATAGG

27

(2) INFORMATION FOR SEQ ID NO:7:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 20 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

GAGGGACTCC ACAGTTATGG

20

140

(2) INFORMATION FOR SEQ ID NO:8:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 20 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

GCACACAATT ATTTGATATG

20

141

(2) INFORMATION FOR SEQ ID NO:9:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 30 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

CTTGCTGTGG CGGTGGTTAG GAGATCAGAC

30

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(2) INFORMATION FOR SEQ ID NO:10:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 30 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

CTCCTGGAAG CCTGTGAATT CCTCAGGAAG

30

143

(2) INFORMATION FOR SEQ ID NO:11:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 21 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

ACCAAGTGCT TCCAGTGGCA G

21

144

(2) INFORMATION FOR SEQ ID NO:12:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 26 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

TCCATGGGGG TCACAAAGAA CTGGAC

26

(45)

(2) INFORMATION FOR SEQ ID NO:13:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 27 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

TGAAGCTTGC TAACAGTATA TCATAGG

27

144

(2) INFORMATION FOR SEQ ID NO:14:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 20 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

GAGGGACTCC ACAGTTATGG

20

147

(2) INFORMATION FOR SEQ ID NO:15:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 20 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

GCACACAATT ATTTGATATG

20

(48)

(2) INFORMATION FOR SEQ ID NO:16:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 27 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

ATGAAACTTA TCCTCACCTG TCTTGTG

27

149

(2) INFORMATION FOR SEQ ID NO:17:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 30 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

GGGTTTTCGA GGGTGCCCCC GAGGATGGAT

30

(50)

(2) INFORMATION FOR SEQ ID NO:18:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 12 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

CGTCGACAGT AC

12

151

(2) INFORMATION FOR SEQ ID NO:19:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 12 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

TGTCGACGGT AC

12

(2) INFORMATION FOR SEQ ID NO:20:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 19 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

CGACGTTGTA AAACGACGG

19

153

(2) INFORMATION FOR SEQ ID NO:21:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 36 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

ATTGTCGACT TATCGATGGG TTGATGATCA AGGTGA

36

154

(2) INFORMATION FOR SEQ ID NO:22:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 32 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

CAAATCGATT GAACTTGCAG TATCTCCACG AC

32

155

(2) INFORMATION FOR SEQ ID NO:23:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 26 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

GGGATCGATC AGATTCTGTC CCCCAT

26

156

(2) INFORMATION FOR SEQ ID NO:24:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 21 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

GGATCCGAGA CACAGAACAG G

21

(2) INFORMATION FOR SEQ ID NO:25:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 21 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

GCTAATCCAT CCATCCTATA G

21

158

(2) INFORMATION FOR SEQ ID NO:26:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 21 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

TTTGGAAAGG ACAAGTCACC G

21

159

(2) INFORMATION FOR SEQ ID NO:27:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 21 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

CTCACTTTTC CTCAAGTTCT G

21

160

(2) INFORMATION FOR SEQ ID NO:28:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 807 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

GGAAGTGCCT	GGAGAGTAAA	ATGTGAGAGT	GGAGTGGAGG	TTGGGTCCCTG	TAGGCCTTCC	60
CATCCCACGT	GCCTCACCGA	GCCCTAGTGC	TACTCAGTCA	TGCCCCCGCA	GCAGGGGTCA	120
GGTCACTTTC	CCATCCTGGG	GGTTATTATG	ACTGTTGTCA	TTGTTGTTGC	CATTTTGCT	180
ACCCCTAACTG	GGCAGCGGGT	GCTTGCAGAG	CCCTCGATAAC	TGACCAGGTT	CCCCCCTCGG	240
AGCTCGACCT	GAACCCCATG	TCACCCCTCGC	CCCAGCCTGC	AGAGGGTGGG	TGACTGCAGA	300
GATCCCTTTA	CCCAAGGCCA	CAGTCACATG	GTTTGGAGGA	GATGGTGCCTC	AAGGCAGAAG	360
CCACCCCTCCA	GACACACCTG	CCCCCAGTGC	TGGCTCTGAC	CTGTCCTTGT	CTAACAGGGCT	420
GACCCCCAGAA	GTGTCCTGG	CGCTGGCAGC	CAGCCTGGAC	CCAGAGCCTG	GACACCCCT	480
GCGCCCCCAC	TTCTGGGGGC	GTACCAGGAA	CCGTCCAGGC	CCAGAGGGCC	TTCCTGCTTG	540
GCCTCGAATG	GAAGAAGGCC	TCCTATTGTC	CTTCGTAGAG	GAAGCAACCC	CAGGGCCCAA	600
GGATAGGCCA	GGGGGGATTC	GGGGAACCGC	GTGGCTCCGG	CGCGGCCCCGG	GCTGGCTGGC	660
TGGCCCTCCT	CCTGTATAAG	GCCCCGAGCC	CGCTGTCTCA	GCCCTCCACT	CCCTGCAGAG	720
CTCAGAAGCG	TGACCCCAGC	TGCAGCCATG	AAGTGCCTCC	TGCTTGCCTC	GGCCCTCACC	780
TGTGGCGCCC	AGGCCCTCAT	CGTCACC				807

461

(2) INFORMATION FOR SEQ ID NO:29:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 824 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

GGAAGTGTCC TGGGAGATTT AAAATGTGAG AGGCAGGGAGG TGGGAGGTTG GGCCCTGTGG	60
GCCTGCCCAT CCCACGTGCC TGCATTAGCC CCAGTGCTGC TCAGCCGTGC CCCCCGCCCA	120
GGGGTCAGGT CACTTCCCCG TCCTGGGTT ATTATGACTC TTGTCATTGC CATTGCCATT	180
TTTGCTACCC TAACTGGCA GCAGGTGCTT GCAGAGCCCT CGATACCGAC CAGGTCCCTCC	240
CTCGGAGCTC GACCTGAACC CCATGTCACC CTTGCCAG CCTGCAGAGG GTGGGTGACT	300
GCAGAGATCC CTTCACCCAA GGCCACGGTC ACATGGTTG GAGGAGCTGG TGCCCAAGGC	360
AGAGGCCACC CTCCAGGACA CACCTGTCCC CAGTGCTGGC TCTGACCTGT CCTTGTCTAA	420
GAGGCTGACC CCGGAAGTGT TCCTGGCACT GGCAGCCAGC CTGGACCCAG AGTCCAGACA	480
CCCACCTGTG CCCCCGCTTC TGGGGTCTAC CAGGAACCGT CTAGGCCAG AGGGGGACTT	540
CCTGCTTGGC CTTGGATGGA AGAAGGCCTC CTATTGTCT CGTAGAGGAA GCCACCCGG	600
GGCCTGAGGA TGAGCCAAGT GGGATTCCGG GAACCGCGTG GCTGGGGGCC CAGCCGGGC	660
TGGCTGGCCT GCATGCGCCT CCTGTATAAG GCCCCAAGCC TGCCTGTCTC AGCCCTCCAC	720
TCCCTGCAGA GCTCAGAACG ACGACCCAG CTGCAGCCAT GAAGTGCCTC CTGCTTGGCC	780
TGGGCCTGGC CCTCGCCTGT GGCGTCCAGG CCATCATCGT CACC	824

162

(2) INFORMATION FOR SEQ ID NO:30:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 288 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

ATCACCTTGA TCATCAACCC AGCTTGCTGC TTCTTCCCAG TCTTGGGTTTC AAGGTATTAT	60
GTATAACATAT AACAAAATTT CTATGATTT CCTATGTCTC ATCTTCATT CTTCACTAAT	120
ACGCAGTTGT AACTTTCTA TGTGATTGCA AGTATTGGTA CTTTCCTATG ATATACTGTT	180
AGCAAGCTTG AGGTGTGGCA GGCTTGAGAT CTGGCCATAC ACTTGAGTGA CAATGACATC	240
CACTTTGCCT TTCTCTCCAC AGGTGTCCAC TCCCAGGTCC AACTGCAG	288

163

(2) INFORMATION FOR SEQ ID NO:31:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 68 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: 1..3, 64..68
- (D) OTHER INFORMATION: /note= "Overhang"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

CGATACCAAG TCGCCTCCAG ACCGCAGACA TGAAACTTGT CTTCCCTCGTC CTGCTGTTCC	60
TCGGGGGCC	68

W64

(2) INFORMATION FOR SEQ ID NO:32:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 14 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

GACTGTGTCT GGCT

14

165

(2) INFORMATION FOR SEQ ID NO:33:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 16 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: 1..2
- (D) OTHER INFORMATION: /note= "Overhang"

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: 17..20
- (D) OTHER INFORMATION: /note= "Overhang on complementary strand"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

CGGTCGACAT CGATGC

16

164

(2) INFORMATION FOR SEQ ID NO:34:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 30 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: -1..-4, 31..34
- (D) OTHER INFORMATION: /note= "Overhangs on complementary strand"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

CAGAACCGTG ACCCCAGTAT CGATAACCTGG

30

167

(2) INFORMATION FOR SEQ ID NO:35:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 31 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: -1..-4,
- (D) OTHER INFORMATION: /note= "Overhang on complementary strand"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

CATCGATCCC TAGCACTCTG ACCTAGCAGT C

31

168

(2) INFORMATION FOR SEQ ID NO:36:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 38 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: 1..4
- (D) OTHER INFORMATION: /note= "Overhang"

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: 39..42
- (D) OTHER INFORMATION: /note= "Overhang on complementary strand"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

TCGAGCGGCC GCCGGACCGG GCCGCCTCGG CCTCGCGA

38

169

(2) INFORMATION FOR SEQ ID NO:37:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 51 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(ix) FEATURE:

- (A) NAME/KEY: misc_feature
- (B) LOCATION: 1..2
- (D) OTHER INFORMATION: /note= "Overhang"

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

CGATAACCAT GAAACTTCTT ATCCTCACCT GTCTTGTCGC TGTTGCTCTT G

(2) INFORMATION FOR SEQ ID NO:38:

- (i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 27 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: double
(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

CCAAGGTCTT TGAAAGGTGT GAGTTGC

27

171